RESEARCH AND WORKING PAPERS ▫ 33

WINNIPEG RESIDENTIAL TAX ASSESSMENT IN 1989: AN UNFAIRLY STRUCTURED CITY?

Tony J. Kuz and Gerald Cariou

INSTITUTE of URBAN STUDIES

UNIVERSITY of WINNIPEG

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INTRODUCTION

Alan Artibise, in his 1984 Winnipeg tax assessment study, concluded that considerable inequity existed in the municipal taxation system (Artibise, 1984). Residential properties of equal market value had very different assessment rates, and consequently paid different taxes. An example of this would be "a house selling at $142,500 in Charleswood was assessed approximately the same amount of municipal taxes ($1,173.85) as a house selling in the inner city for $42,000 ($1,180.64)" (Artibise, p. 12). While the Artibise study was not spatial in nature, it is possible to conclude from some of the empirical examples provided that inner city properties were over-assessed, and consequently pay much higher tax rates than similarly valued properties in the suburbs.

Since 1984, much has transpired in Winnipeg concerning property tax assessments and tax rates. In 1987, a general reassessment was done, and the base year for property valuations was established to be 1975. In 1990, there was another reassessment, with the base year for property valuation being 1985.

It is, then, the objective of this research to verify the equity of the residential property tax assessment in Winnipeg for 1989. The research design employs the variable market values of residential property in 1985 and the assessed value of residential property in 1989. The research design is highly flexible, as the market value of property in 1985 variable will be used again to verify, in future, the equity of the 1990 property tax assessment in Winnipeg.

SOME THEORETICAL CONSIDERATIONS

What would constitute "fair assessment" of a residential property for tax purposes? The literature states that the axiom of equal valuation of equals must hold. This means that all properties of similar land use (e.g., residential) and market value must be valued equally for tax assessment (Thrall, 1979a, p. 278). The following identity must hold:

$$AV = \lambda.MV \qquad (1)$$

where: AV = assessed value

MV = market value

λ = proportion of true market value at which assessments are levied

For the property tax to be a constant proportion of market value, λ must be spatially invariant.

By rearranging equation (1)

$$\lambda = (AV/MV) \qquad (2)$$

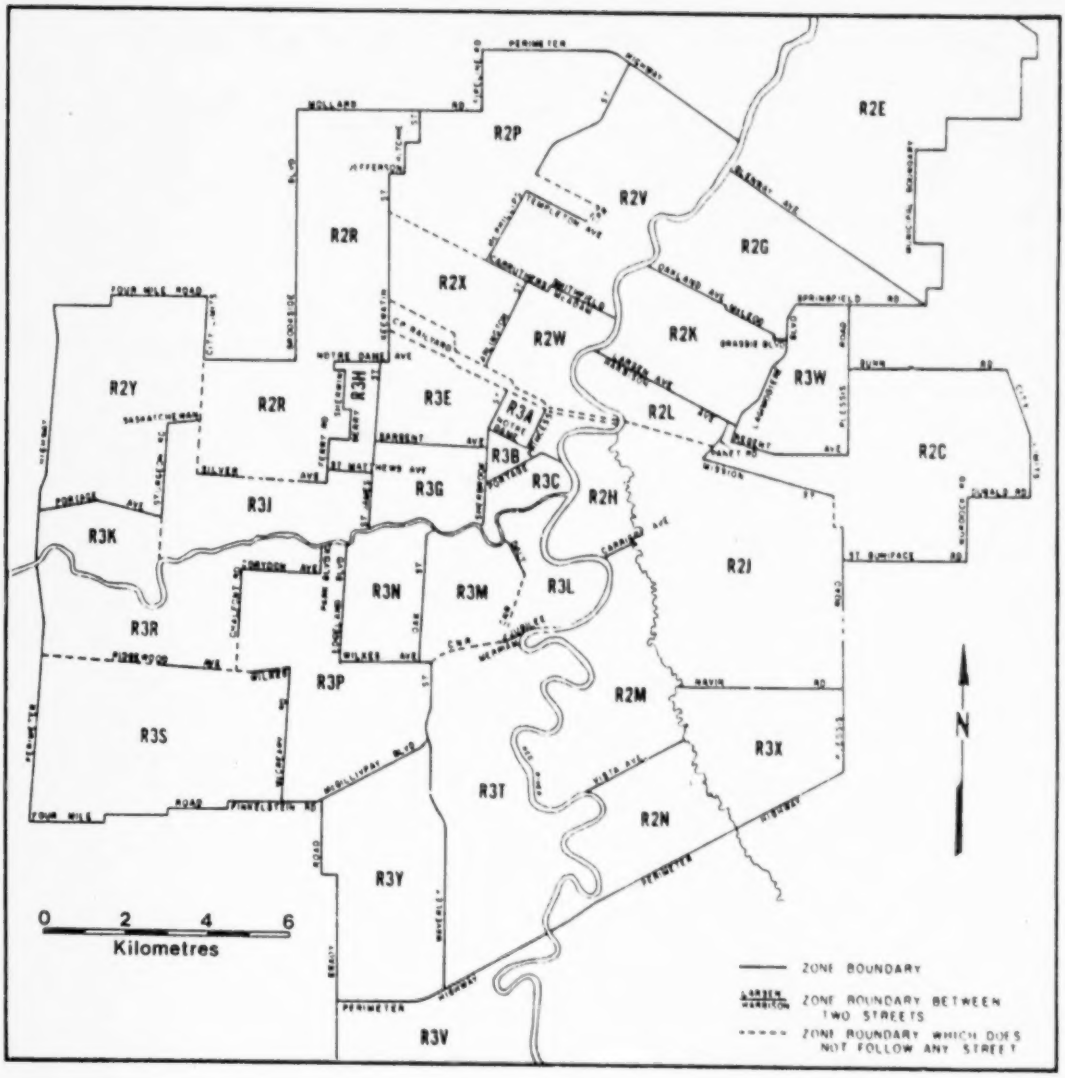

Figure 1: Winnipeg Postal Code Zones

In actual practice, it is impossible to have an invariant λ. Whatever the mode of assessment, some variations in λ are inevitable. However, it should be the goal of every assessor to minimize such variations as much as technology and administrative budgets will allow (Thrall, 1979b, p. 124).

What factors contribute to variations in λ? It is important to separate the influences into constituent parts in order to more easily identify the source of the variation. Anything that affects the prices gives rise to variations in the denominator (MV), whereas anything that affects the numerator is an institutional characteristic.

Some of the factors which increase or decrease market value of a property are:

1. negative externalities;
2. renovation;
3. quality of construction;
4. population transition of ethnic, income, or racial groups;
5. increasing intensity of land use;
6. incorrect knowledge of true market value;
7. inclusion of non-assessment items such as stove, refrigerator, window coverings in the selling price; and so forth.

The institutional factors giving rise to inequities in tax assessment are:

1. *Non-uniform changes in market valuation.* As market values change differently depending on location and assessed values remain the same, this will give rise to a spatially differentiated λ.
2. *Group Pressure.* Assessors fearing appeals and/or political reprisals, intentionally under value property in the potentially more organized, well-to-do areas.
3. *Employing assessment methods which bias the equitable property-tax assessment rule*; and so forth.

An equitable assessment should have the following relation between the ratio (AV/MV) and MV

$$(AV/MV) = a + b\ MV$$

where: a = the intercept value taking on the value of λ

b = slope of the line and this value should be zero

Diagrammatically, the above equation would be represented as follows:

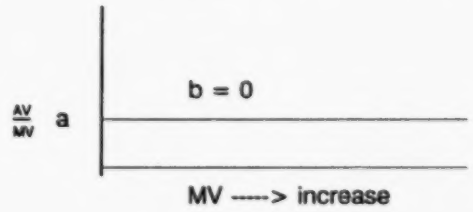

TABLE 1

CHARACTERISTICS BY PRICE CLASS

MARKET VALUE CHARACTERISTICS

Price Class	Number of Observations	Mean	Standard Deviation	Kurtosis	Skewness	Maximum	Minimum
20,000-40,000	88	32,192	5,891	-1.00	- .405	40,000	20,500
40,001-60,000	61	49,636	5,640	-1.22	.018	60,000	40,455
60,001-80,000	68	69,353	5,299	-1.07	.169	80,000	61,000
80,001-100,000	18	89,722	6,257	-1.59	.012	100,000	81,500
>100,000	28	140,967	31,608	.28	1.017	214,500	102,000

WINNIPEG CMA: STUDY AREA AND DATA CHARACTERISTICS

The data for this study were obtained from two major sources and organized using a stratified-random sampling procedure. To ensure a complete spatial coverage, the three-digit postal code zones were used. In 1989, the Winnipeg Census Metropolitan Area (CMA) was divided into 34 postal code areas; however, only 27 were used in this study (Figure 1). The areas omitted (R2E, R3H, R3S, R3V, R3W, R3X, R3Y) were for 1985, characterized by predominantly commercial or industrial land uses, or they were located in the outer fringe areas and contained very low densities of residential properties and significant areas of open space. Their omission does not cause any problems concerning proper area coverage within the city. An added advantage of using postal code areas is the availability of published Statistics Canada socio-economic data at this level of disaggregation. Thus, any further research in this area is possible by using the areal units chosen for this study. As an example, an empirical study of the relation between assessed to market value ratio and median income would likely be a valuable addition to the findings of the current research regarding property tax inequity. (A preliminary study indicated a strong inverse relation between the AV/MV ratio and median income; the higher the median income, the lower the assessment to market value ratio).

For each postal code area, 10 residential properties were randomly selected, and their 1985 market values and 1989 assessment values recorded.[1] The total sample size for this study was 270 residential properties. The market values for each property was obtained from the publication *Digest: Real Estate and Law Journal*, and the land and building assessments for each property were collected from information which is available to the general public at the Winnipeg Land Titles Office.[2] To obtain the total assessment for each property, the land and building assessments were simply added together.

Employing the assessed (AV) and market values (MV) for each property, another variable was created, the assessed value to market value ratio (AV/MV). This variable is of crucial importance to this study, because it provides the basis on which judgement can be made regarding the fairness of a property's assessment.

TABLE 2

CHARACTERISTICS BY PRICE CLASS

ASSESSED VALUE CHARACTERISTICS

Price Class	Number of Observations	Mean	Standard Deviation	Kurtosis	Skewness	Maximum	Minimum
20,000-40,000	88	16,185	3,604	3.27	.868	32,320	9,630
40,001-60,000	61	20,933	4,392	- .40	.325	32,270	11,860
60,001-80,000	68	29,587	3,489	1.84	.884	42,010	23,000
80,001-100,000	18	39,353	8,574	8.94	2.692	69,230	31,250
>100,000	28	55,480	14,184	- .85	.677	81,030	33,680

THE ANALYSIS OF THE AV/MV RATIO

In order to determine the equity of residential tax assessment in Winnipeg, the AV/MV ratio was analyzed in a variety of ways:

1. The AV/MV ratio was analyzed as a single distribution (N=263) using descriptive statistics.
2. The market value data were ordered into five classes, and then each category was analyzed for its AV/MV ratio characteristics.
3. The AV/MV ratio was analyzed at the postal code level to determine spatially the areas in Winnipeg which are over-, under- and fairly assessed.

A brief comment on the descriptive statistics for the market value variable is helpful, because it will give an idea of the characteristics of the data being used in the study. For the 263 observations,[3] the mean market value of the distribution was $61,364 and the standard deviation was $34,617. The minimum value in terms of market value was $20,500, and the maximum was $214,500. As the objective of this study was to gather a sample that was representative of the majority of housing within the city, these figures indicate that this was successfully achieved (the average transaction price through multiple listing in 1985 was $62,952). The range between the minimum and maximum values indicates that the data set contains sufficient variation by which comparisons in assessment values can be made, as well as showing the pertinent socio-economic classes of property within the city (Tables 1 and 2). Only the most expensive properties in the city are not included, and the total number of these properties in Winnipeg is not great, so this should not cause any problems for the analysis.

THE AV/MV RATIO (N=263)

As the requirements of equitable property tax assessment dictate the distribution of the AV/MV ratio be leptokurtic (very small variations around the mean), the variation that is apparent for this distribution indicates that it is not. The mean ($\bar{x}$) for the distribution is equal to .451, and the standard deviation (s.d.) is .093. These values indicate that on average, the tax assessment on a property is 45.1 percent of market value, while the standard deviation indicates considerable variation around the mean. If the AV/MV ratio was normally distributed (in this case its skewed to the right), it would indicate that approximately 68 percent of the observations had AV/MV ratios between 35.2 and 54.4 percent, and approximately 95 percent of the observations had AV/MV ratios between 26.1 and 63.3 percent. The lowest ratio value in the sample was .24, while the highest was .92, giving a difference in the range of values of .68, a totally unacceptable, as well as unexplainable, figure.

TABLE 3

CHARACTERISTICS BY PRICE CLASS

ASSESSED VALUE/MARKET VALUE CHARACTERISTICS (AV/MV)

Price Class	Number of Observations	Mean	Standard Deviation	Kurtosis	Skewness	Maximum	Minimum
20,000-40,000	88	.511	.113	2.07	1.093	.92	.31
40,001-60,000	61	.421	.073	.91	.376	.65	.24
60,001-80,000	68	.427	.045	2.67	1.262	.61	.36
80,001-100,000	18	.438	.078	10.61	2.935	.72	.35
>100,000	28	.395	.057	.47	.284	.52	.28

THE DIRECTION OF INEQUALITY: AV/MV RATIOS AND MARKET VALUES

Dividing the sample market values into homogeneous categories, and then looking at the mean assessment to market value ratio for each, is a useful method for identifying the direction of assessment inequity within a city. This method allows for direct comparisons of assessment rates between higher and lower priced housing contained in the sample.

For the purpose of this study, five categories of market values were created. This is justified by the fact that in the current study, the range in market values is best represented by such a division (the smaller the range of values in a category, the more detailed the study). In addition to this, the total number of observations represented in each category divides the overall total into acceptable numbers; the lowest total still has 18 observations while the highest has 88 (Table 3).

These results indicate that on the basis of price categories, tax assessments are consistently higher for lower priced housing, and generally decrease as the market value of the dwellings increase. The housing in the lowest price category is on average assessed at a rate of 51 percent of its market value, 6 percent above the average rate for the entire sample (45.1%), and fully 12 percent above the dwellings valued over $100,000 (39.5%). The observations with market values between $40,000 and $100,000 appear to be more consistently assessed, and the rates of assessment are near the overall mean of the distribution.

It is also apparent that housing in the lowest market value category has a larger standard deviation than the higher value categories, indicating poor and inconsistent assessment. Variations in assessments within the categories can be indicated by calculating the coefficient of variation (C.V. = standard deviation/mean), a statistic which shows the homogeneity of a particular characteristic within separate distributions. In general, higher values indicate heterogeneity of the characteristic and lower values homogeneity. The C.V. values for each category are as follows:

PRICE CLASS	C.V.
20,000-40,000	.22
40,001-60,000	.17
60,001-80,000	.11
80,001-100,000	.19
>100,000	.14

TABLE 4

MEAN MV, MEAN AV, AND MEAN AV/MV RATIO BY POSTAL CODE AREA

Postal Code	Mean MV	Mean AV	Mean AV/MV	Z-Score AV/MV
R2W	44,700	20,366	.459	0.06
R2X	41,750	18,048	.449	-0.04
R3L	37,790	17,553	.467	0.15
R2P	74,816	31,934	.437	-0.17
R2V	65,100	28,996	.448	-0.05
R2K	51,620	24,691	.462	0.09
R2C	59,080	25,127	.434	-0.20
R2L	36,040	15,843	.443	-0.11
R2G	76,298	33,079	.456	0.03
R2H	47,222	18,244	.390	-0.68
R2M	59,900	24,074	.392	-0.66
R2N	67,575	27,853	.415	-0.41
R2J	63,100	28,108	.461	0.08
R3T	94,761	35,893	.391	-0.67
R3E	33,490	17,573	.554	1.08
R3G	42,911	17,965	.430	-0.24
R3A	31,694	18,066	.608	1.67
R3B	35,180	18,211	.540	0.94
R3C	41,950	23,348	.538	0.91
R2R	57,895	27,810	.495	0.45
R3K	75,495	30,961	.425	-0.30
R3J	61,600	26,654	.425	-0.30
R2Y	78,440	32,811	.419	-0.37
R3R	75,200	31,790	.430	-0.25
R3N	89,430	33,227	.378	-0.81
R3M	58,630	23,139	.417	-0.39
R3P	164,300	68,051	.417	-0.39

These values suggest that the lowest priced housing in the city also shows the greatest variation in assessed values, and this reinforces the conjecture that lower priced housing is the most poorly assessed. All other categories of house prices have C.V. values less than the 20,000-40,000 category, and thus are more similar in their assessment characteristics, although the 80,001-100,000 category also shows considerable variation.

The disparity in assessments between housing of low- and high-market values is very evident using the procedure just outlined. These methods are, however, non-spatial in nature, and simply establish the direction of inequity based on market value. The next step in the analysis will shed light on the actual spatial distribution of property tax assessment inequity in the city.

THE SPATIAL DISTRIBUTION OF TAX-ASSESSMENT INEQUITY

The AV/MV ratio was analyzed at the postal code level. For each postal code, the mean AV/MV was calculated (Table 4). These 27 means were then further analyzed and converted into Z-scores.[4]

The object of this exercise was to classify the postal code areas in order to identify spatially those areas which are over, under and fairly assessed.

The class categories were defined as follows:

CLASS	Z-SCORE RANGE
1	0.00 to 0.50
2	0.51 to 1.00
3	>1.00
4	-0.50 to 0.00
5	-1.00 to -0.51

In the new distribution, the mean is zero and the standard deviation 1.0. The categories defined here indicate the magnitude of over- and under-assessment relative to the market value of residential property in Winnipeg. The positive categories indicate degrees of over-assessment, and the negative categories indicate degrees of under-assessment.

As has been addressed previously, a variety of factors may contribute toward an AV/MV ratio which is not the same for all properties. As an example, the selling price of a home may include stove,

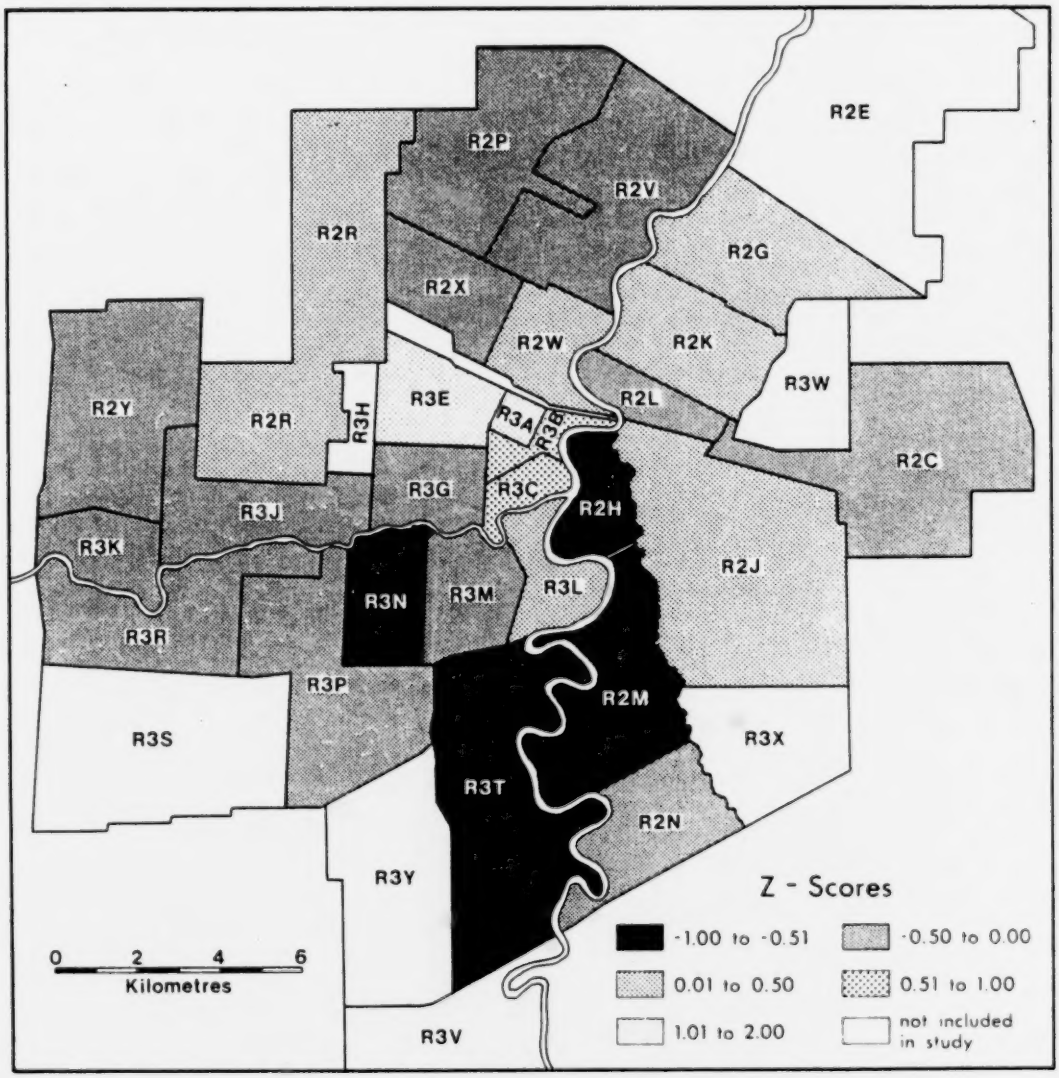

Figure 2: Classification of Postal Code Areas Based on AV/MV Ratios

refrigerator, dishwasher, curtains, etc., items which are not assessed for tax purposes, but influence the selling price of the home. To accommodate this variation in selling price, the categories 0.00 to ± 0.50 are considered to represent fair assessment.[5] The remaining categories show variations which simply cannot be attributed to variations in selling price, but are examples of variations in assessments.

The results indicate that the majority of the postal code zones (19 out of 27) can be considered fairly assessed using this criterion (Figure 2). For the most part, these areas are in the suburban regions which surround the Central Business District (CBD). These areas are spread throughout the city, and as a result, vary widely in terms of character.

Four postal code zones constitute areas which are over-assessed with mean assessment ratios greater than +0.50 standard deviations from the mean. These zones are clustered together, and are located close to or within the CBD. Two of these zones are extremely over-assessed, with Z-scores of +1.67 for R3A and +1.08 for R3E. Both of these zones contain housing with low mean market values: R3A has a mean value of only $31,964, and R3E, $33,490. This reaffirms the earlier observations that the lowest valued housing is also the most highly assessed.

Figure 2 also shows four postal code areas which are under-assessed, with Z-scores less than -0.50 standard deviations from the mean. These zones all share the characteristic of a location tangential to the riverbank, and they are located in the south and west areas of the city. Two of these areas contain housing with high mean market values. These are R3N, with a mean value of $89,430, and R3T, with a value of $94,761. The findings once again indicate that the higher priced housing in Winnipeg is under-assessed.

MULTIVARIATE ANALYSIS OF AV, MV, AND LOCATION

By performing a multiple regression using binary variables to denote location, it is possible simultaneously to generate equations which can indicate the assessment that a home of any given value would have, depending on which sector it falls into, as shown in Figure 1. For this purpose, zones which were defined as fairly assessed will be in sector 0, those under-assessed will be in sector 1, and those over-assessed in sector 2. The relation between the AV and MV within the three sectors can be represented by the equation:

$$\hat{AV} = \pm a \pm b_1 MV \pm b_2 X_2 \pm b_3 X_3 \pm Sy.x$$

where:

$\hat{AV}$ = Assessed value expected

MV = Market value

X_2 = Observation *i* having a value of 1 if located in sector 2, zero otherwise

TABLE 5

REGRESSION TO DETERMINE SECTOR DIFFERENCES IN RELATIVE BEHAVIOUR BETWEEN ASSESSED VALUE AND MARKET VALUE

Independent Variable	Regression Coefficient	t-Value	Significance Level
MV	-6.2368 -07	-4.274	.0000
Sector 1	-0.0413	-2.985	.0031
Sector 2	0.1004	6.986	.0000
a-value = 43.151			
Sy.x = 0.077			
MR2 = 0.307			
F = 38.399		Sign. F = .0000	

X_3 = Observation *i* having a value of 2 if located in sector 3, zero otherwise

a, b_1, b_2, b_3 = Parameters of the regression equation

Sy.x = Standard error of the estimate

From this general equation, three separate equations for each sector can be derived:

Sector 0 fairly assessed $\hat{AV} = a - b_1 MV$

Sector 1 under-assessed $\hat{AV} = a - b_1 MV - b_2 X_2$

Sector 2 over-assessed $\hat{AV} = a - b_1 MV + b_3 X_3$

The parameters for the equation, along with measures of correlation, are presented in Table 5. All of the independent variables, and the overall equation, are statistically significant at at least the .01 level.

Using these three equations, we can calculate the assessment rate for a property of any value for each sector. If the example of a property with a market value of $75,000 is used, the rates in each sector are:

Sector 0 $\hat{AV} = .48057 - .000000627 (75,000)$
$= .43379$

Sector 1 $\hat{AV} = .48057 - .000000627 (75,000) - .0413 (1)$
$= .39249$

Sector 2 $\hat{AV} = .48057 - .000000627 (75,000) + .1004 (1)$
$= .53419$

The actual assessment on an $75,000 property would range from a low of 29,436 to a high of 40,064, depending on the location of the property (Table 6). The actual municipal taxes paid in each sector can be calculated by multiplying the actual assessment by the millage rate. The millage rate for Winnipeg for 1989 was 32.246, and, in each sector, a house worth $75,000 in 1985 would have paid the following municipal taxes:

Sector 0 32,534 x .032246 = $1,049.09

Sector 1 29,436 x .032246 = $ 949.19

Sector 2 40,064 x .032246 = $1,291.90

These results show that in the postal code zones which are over-assessed (Sector 2), a property with a market value of $75,000 would have paid $342.71 more in municipal taxes in 1989 than a property

TABLE 6

FORECASTED PROPERTY TAX INEQUITY BY GEOGRAPHIC AREA

Geographic Area	Dwelling Price	Forecasted Assessment*	Forecasted Tax	Amount Overtaxed**
0	75,000	32,534	1049.09	------
1	75,000	29,436	949.19	- 99.90
2	75,000	40,064	1291.90	+242.81

* Derived from regression analysis in Table 5.
The 1989 Winnipeg, Manitoba millage rate was 32.246.

** Overtaxed = Forecasted tax - Correct tax.
Correct tax for a $75,000 dwelling in 1989 was 1,049.09.

of identical market value in the under-assessed zones (Sector 1), and $242.81 more than a fairly assessed property of identical value in Sector 0. It is obvious that such disparities should not be tolerated, but this type of inequity has been present for a long time, and it is hoped that with the 1990 reassessment, this situation has been fully redressed. It is quite clear that up to 1990, the city was losing money in some parts from incorrect assessments, while in other areas owners were paying too much.

CONCLUSION

This study has conclusively demonstrated that assessment rates in Winnipeg in 1989 varied widely for properties with similar market values. This assessment variation, in general, favoured the higher valued properties, and consequently the wealthier segment of the population. Empirical evidence clearly indicated that the poorer homeowners were subsidizing the middle- and upper-income groups by contributing a disproportionate share of revenue to the City of Winnipeg. While the absolute amounts vary in the $100-$300 range on average per year, cumulatively, these are quite substantial when considered over a period of time.

In the assessment of property, there will always be a margin of error. However, there is reasonable error and unreasonable error. This error threshold must be clearly defined and assessments regularly monitored to make certain that the assessment system is fair. This monitoring must be done within the context of the entire city and not just neighbourhoods. As the present research has shown, neighbourhood comparisons may indicate very similar assessments for similarly valued property; wider comparisons may indicate considerable disparities.

EPILOGUE

In May 1990, the new residential reassessments along with a statement of taxes were issued to Winnipeg homeowners. The reaction, mostly outrage, was instantaneous as parts of the city experienced increases in tax of 10 to 50 percent. The largest increases appeared in River Heights (postal code area R3N), Linden Woods (R3P) and Charleswood (R3R), generally those areas which previously had been identified as grossly under-assessed. Other parts of the city had their assessments lowered (the reassessment was to be revenue neutral), but these areas are difficult to identify, as media attention has largely concentrated on those areas which experienced the largest tax increases and the loudest protests.

Has taxation equity been achieved by the 1990 reassessment? Newspaper articles are reporting instances of similarly priced homes still being assessed very differently and paying substantially different

taxes. Only further empirical research will truly establish the equity of the present tax assessment, and whether the unfairness of past assessments has been fully addressed.

NOTES

1. Some fault may be ascribed to the present research design based on the following. In 1987, the Winnipeg assessment office conducted a general reassessment of properties. For tax purposes, the portioned assessment was based on 1975 market values, not 1985 market values, as used in this study. The reason for this research strategy was to facilitate a longitudinal analysis of tax assessment equity in Winnipeg. In 1990, properties were again reassessed, and the portioned assessment was based on 1985 market values. The authors were aware of this when we initiated this research design, therefore the sample used in this study will simply be used again in their 1990 assessments to ascertain the equity of tax assessments for the 1990-1993 period. It is usual in longitudinal studies that some compromises must be made, as they have been here. However, using 1985 market values instead of 1975 market values in no way compromises or invalidates the conclusions reached in this study.

2. In Manitoba, the accounting method is used to determine the market value of property. This method involves costing such things as materials and labour force for some base year, and then adding these estimates to determine market value of a dwelling. Size, type, and quality of construction, materials, age, condition and other relevant factors are also considered. Once the land and building market values are determined, a portion of the total is taken to calculate the portioned assessment. This amount multiplied by the mill rate divided by 1000 determines the taxes levied against any property.

3. We attempted to generate 10 observations for each of the 27 postal codes zones to achieve a total sample size of 270. Due to the fact that some of the observations that were collected were later found to cause problems for interpretation (observations with AV/MV ratios greater than 1.0), seven (7) were eventually eliminated, and the final sample size totalled 263 residential dwelling units.

4. A Z-score is calculated using the following formula:

$$Z_i = \frac{X_i - \bar{x}}{s.d.}$$

where: X_i = ith value
$\bar{x}$ = mean of a distribution
s.d. = standard deviation of a distribution

To illustrate the calculation of a Z-score for postal code area R3A, the following values are used:

$$Z = \frac{.608 - .453}{.093}$$
$$= +1.67$$

where: .608 is the mean AV/MV value for area R3A; .453 is the mean for the AV/MV distribution (N=263) and .093 is the standard deviation for the AV/MV distribution (N=263).

5. The fair assessment category is this research is broadly defined. The Z-score range of 0.0 to ± .50 in relative terms represents a range of ± 4.65 percent (9.30 ÷ 2 = 4.65). If we had restricted this category, other postal code areas would have fallen into the under- and over-assessed categories. If the tax assessment were consistent and perfectly reflected market values, the standard deviation for the AV/MV ratio would be zero or near zero, and all properties would fall into the fairly assessed grouping.

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